March 17, 1965

Mr. Gene Vacca
NASA Headquarters
Code REI
Building 10B, Room 6016
Washington, D.C.

Dear Mr. Vacca:

The following is a summary report of progress on the NASA Contract R-09-022-019 per our discussions on March 16, 1965. As we have discussed previously our fundamental goal is the continued improvement and extension of the effective utilization of computers to various problems of concern to NASA and other agencies. We have approached this task by examining various applications and analyzing the system configurations required to perform them. In particular in the areas where graphical displays are required, emphasis has been placed on establishing the proper balance between hardware and software functions.

The basic concept of interfacing a central computer complex to a series of remote stations ranging in various degrees of complexity (such as a simple teletype to a subordinate processor) has been discussed and its feasibility demonstrated elsewhere. Our task has been to examine such systems and formulate conclusions as to their capabilities and limitations, and to design and develop a system at NBS for experimenting with actual Agency problems. This system has given impetus to intensive design efforts in the concept of the remote station functions to minimize the limitations introduced by communication lines and the rather simple but time consuming burden placed on the main frame to produce display regeneration and manipulation.

This effort has led to the design and construction of a graphical display substation to be connected to the system. This device is called MAGIC (Machine for Automatic Graphic Interface to Computers). A complete report is being prepared on all technical aspects of the station including the programming procedure. This report will be issued as an NBS grayback and will be available during April.

This substation was initiated in August 1964 and completed in
February 1965. NASA support has been utilized in its completion and
in the development of several programs which have been prepared to date.
The programs fall into three basic categories: programs to enhance
communication with the machine and to expedite the preparation of
internal programs; display or graphical data manipulation programs; and
demonstration programs which touch on specific applications.

Our next step is to integrate this station into a full-scale
system by interfacing it to a large computer complex. As I discussed,
the present system is not yet in existence at NBS. However, with our
efforts and the cooperation of the Army CCIS-70 program we have or will
receive before the end of March the Mobidic B twin computers with two
disc files, each with 6.25×10^6 characters storage capability, and two
I/O converters with about 16 solid state switching units. This system
was an operating portion of a much larger system of CCIS-70 and we
sincerely believe it to be in excellent condition. Our immediate goal
on receiving the equipment is to install it in the ex-SEAC area in the
identical configuration used by the Army, to enable and expedite the
debugging and checkout of the equipment. This will be financed by NBS.
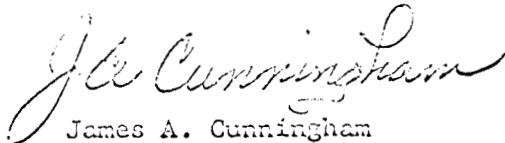
The next phase is to interconnect the equipment to our existing
PILOT system and our arrangement of remote substations as shown in the
attached figure. We are presently engaged in the design and construction
of interface equipment necessary to connect MAGIC to the system. Our
intentions are to proceed rather rapidly on this task in order to complete
as much as possible before the Mobidic computers actually arrive, since
some of the same individuals will be responsible for the Mobidic installation
and checkout. Therefore, we are at a peak spending rate at this time until
Mobidic arrives, as I indicated.

Other tasks such as the design of Model II MAGIC will continue with
emphasis on the following problem areas. These are the increased circuit
speed, increased number of points per display frame, increased performance
in display lines, characters, curves, etc., and perhaps the most important,
the development of improved boundary conditions with combination analog-
digital techniques.

Our present plans call for the rather complete design of MAGIC II
by July 1965. This allows sufficient laboratory experimentation to check
feasibility of anticipated analog-digital techniques and allows an accurate
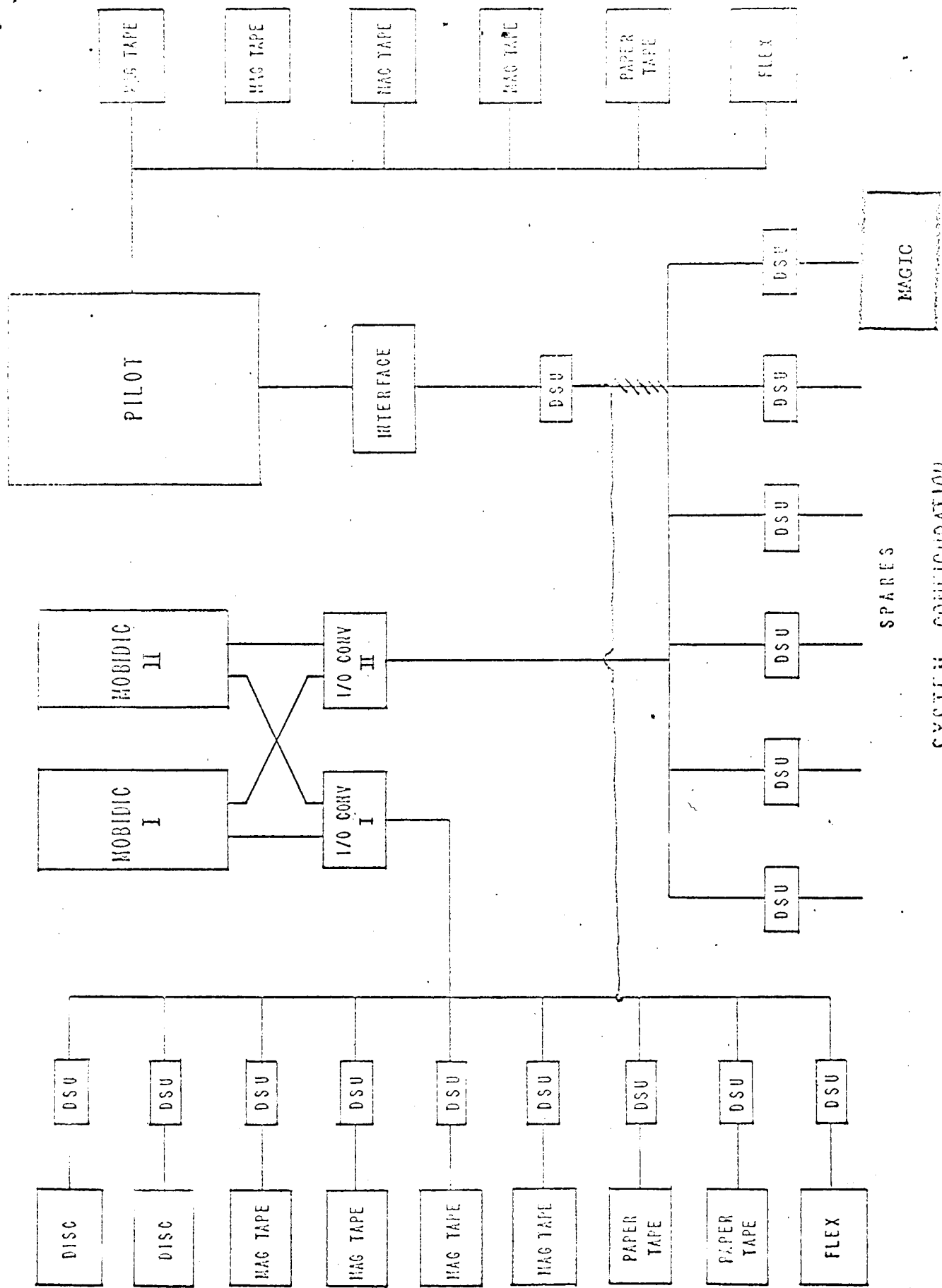estimation of the cost and construction time required for MAGIC II. Our

intention is to publish a report in July of our proposed design of
MAGIC II. We also plan to have constructed the interface between our
present MAGIC I and our central computer complex, and to initiate the
actual interconnection and testing, using preliminary test programs.

Very truly yours,

James A. Cunningham
Chief, Computer Technology Section
Information Technology Division

Enclosure

MAG TAPE MAG TAPE MAG TAPE MAG TAPE PAPER TAPE FLEX

PILOT

INTERFACE

DSU

DSU | MAGIC

DSU

DSU

DSU

DSU

MOBIDIC II   MOBIDIC I

I/O CONV II   I/O CONV I

SPARES

DSU DSU DSU DSU DSU DSU DSU DSU DSU

DISC DISC MAG TAPE MAG TAPE MAG TAPE MAG TAPE PAPER TAPE PAPER TAPE FLEX

SYSTEM CONFIGURATION

for Multipurpose Computer Facility with Remote Display and Time-Sharing.